

**Amendments to the Claims**

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

1-14. (canceled)

15. (new) Process for the arc welding in pulsed mode of one or more workpieces made of carbon steel, stainless steel, aluminum or aluminum alloy, with the use of a gas shield, in which an electric arc welding torch is supplied with at least one consumable wire at a wire feed speed ( $V_{\text{wire}}$ ) and the consumable wire is subjected to current pulses, in order to melt the end of the consumable wire and to detach a drop of molten metal by a current impulse, and in which, for a given pulse frequency, a wire feed speed ( $V_{\text{wire}}$ ), a mean current ( $I_{\text{mean}}$ ) value and an rms current ( $I_{\text{rms}}$ ) value such that:

$$I_{\text{mean}} = A_1 V_{\text{wire}} + B_1, \text{ where } 5 < A_1 < 45 \text{ and } 0 < B_1 < 50 \text{ and}$$

$$I_{\text{rms}} = A_2 V_{\text{wire}} + B_2, \text{ where } 5 < A_2 < 45 \text{ and } 40 < B_2 < 100,$$

where  $I_{\text{mean}}$  and  $I_{\text{rms}}$  are expressed in amps and  $V_{\text{wire}}$  is expressed in m/min, are chosen, and wherein:

the wire feed speed ( $V_{\text{wire}}$ ) is between 1 and 20 m/min; the pulse frequency is between 20 and 300 Hz; and

the ratio ( $I_{rms}/I_{mean}$ ) of the rms current ( $I_{rms}$ ) value to the mean current ( $I_{mean}$ ) value is between 1.05 and 2.

16. (new) Process according to Claim 15, wherein the workpiece or workpieces to be welded are made of carbon steel and the mean current ( $I_{mean}$ ) value and the rms current ( $I_{rms}$ ) value, such that:

$$I_{mean} = A_1 V_{wire} + B_1, \text{ where } 20 < A_1 < 40 \text{ and } 0 < B_1 < 30 \text{ and}$$

$$I_{rms} = A_2 V_{wire} + B_2, \text{ where } 19 < A_2 < 39 \text{ and } 40 < B_2 < 100,$$

where  $I_{mean}$  and  $I_{rms}$  are expressed in amps and  $V_{wire}$  is expressed in m/min, are chosen.

17. (new) Process according to Claim 15, wherein the workpiece or workpieces to be welded are made of stainless steel and the mean current ( $I_{mean}$ ) value and the rms current ( $I_{rms}$ ) value, such that:

$$I_{mean} = A_1 V_{wire} + B_1, \text{ where } 10 < A_1 < 40 \text{ and } 0 < B_1 < 40 \text{ and}$$

$$I_{rms} = A_2 V_{wire} + B_2, \text{ where } 9 < A_2 < 39 \text{ and } 40 < B_2 < 100,$$

where  $I_{mean}$  and  $I_{rms}$  are expressed in amps and  $V_{wire}$  is expressed in m/min, are chosen.

18. (new) Process according to Claim 15, wherein the workpiece or workpieces to be welded are made of aluminum or

aluminum alloy and the mean current ( $I_{\text{mean}}$ ) value and the rms current ( $I_{\text{rms}}$ ) value, such that:

$$I_{\text{mean}} = A_1 V_{\text{wire}} + B_1, \text{ where } 5 < A_1 < 30 \text{ and } 0 < B_1 < 20 \text{ and}$$

$$I_{\text{rms}} = A_2 V_{\text{wire}} + B_2, \text{ where } 5 < A_2 < 25 \text{ and } 40 < B_2 < 65,$$

where  $I_{\text{mean}}$  and  $I_{\text{rms}}$  are expressed in amps and  $V_{\text{wire}}$  is expressed in m/min, are chosen.

19. (new) Process according to Claim 15, wherein the wire feed speed ( $V_{\text{wire}}$ ) is between 2 and 15 m/min.

20. (new) Process according to Claim 15, wherein the pulse frequency is between 50 and 200 Hz.

21. (new) Process according to Claim 15, wherein the ratio ( $I_{\text{rms}}/I_{\text{mean}}$ ) of the rms current ( $I_{\text{rms}}$ ) value to the mean current ( $I_{\text{mean}}$ ) value is between 1.1 and 1.8.

22. (new) Process according to Claim 15 wherein the workpiece or workpieces to be welded are made of carbon steel and the ratio ( $I_{\text{rms}}/I_{\text{mean}}$ ) of the rms current ( $I_{\text{rms}}$ ) value to the mean current ( $I_{\text{mean}}$ ) value is between 1.05 and 2.

23. (new) Process according to Claim 15, wherein the workpiece or workpieces to be welded are made of stainless steel

and the ratio ( $I_{rms}/I_{mean}$ ) of the rms current ( $I_{rms}$ ) value to the mean current ( $I_{mean}$ ) value is between 1.05 and 2.

24. (new) Process according to Claim 15 wherein the workpiece or workpieces to be welded are made of aluminum or aluminum alloy and the ratio ( $I_{rms}/I_{mean}$ ) of the rms current ( $I_{rms}$ ) value to the mean current ( $I_{mean}$ ) value is between 1.05 and 2.

25. (new) Process according to Claim 15, wherein the gas shield consists of a gas or gas mixture selected from the group consisting of helium, argon, carbon dioxide, oxygen, nitrogen and hydrogen and the consumable wire has a diameter of between 0.6 mm and 2.2 mm.

26. (new) Process according to Claim 15 wherein the welding is of the pulsed MIG or pulsed MAG type and the wire is a solid wire or a flux-cored wire.

27. (new) Pulsed arc welding device, capable of implementing a process according to Claim 15, comprising:

- frequency selection means for setting, adjusting or selecting a pulse frequency;
- wire speed selection means for setting, adjusting or selecting a wire feed speed ( $V_{wire}$ );

- means for determining the mean current ( $I_{\text{mean}}$ ) and rms current ( $I_{\text{rms}}$ ) values making it possible to determine or calculate at least one mean current ( $I_{\text{mean}}$ ) value and at least one rms current ( $I_{\text{rms}}$ ) value such that:  
 $I_{\text{mean}} = A_1 V_{\text{wire}} + B_1$ , where  $5 < A_1 < 45$  and  $5 < B_1 < 50$  and  
 $I_{\text{rms}} = A_2 V_{\text{wire}} + B_2$ , where  $5 < A_2 < 45$  and  $45 < B_2 < 110$ ,  
where  $I_{\text{mean}}$  and  $I_{\text{rms}}$  are expressed in amps and  $V_{\text{wire}}$  is expressed in m/min; and
- current adjustment means for adjusting the welding current in response to the determination or calculation of the mean current ( $I_{\text{mean}}$ ) and rms current ( $I_{\text{rms}}$ ) values by the means for determining the mean current ( $I_{\text{mean}}$ ) and rms current ( $I_{\text{rms}}$ ) values; and
- optionally at least one welding current generator.

28. (new) Welding unit comprising at least one device according to Claim 27, at least one welding torch, at least one source of welding wire and at least one source of shielding gas.